# THE SIFT ALGORITHM BASED FAKE COIN DETECTION

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ABSTRACT

This paper presents a method for detection of fake coins using image processing. A coin image is represented in a dissimilarity space, which means vector space is constructed for comparing the two coin images. For comparison we detect the key points of two images and describes the key points in vector space. For the above two process we take the algorithm know as SIFT (Scale Invariant Feature Transform) . The features of the image has to detected, these are called SIFT features of the image, from these identified features the SIFT key points has to be detected. Then the described features are subjected to removal of keypoints which has low contrast. after that the survived key points are matched between two images. Here a dissimilarity matrix is obtained used to classify the result ,whether there are many types. In our paper we calculate Manhattan distance. So only genuine coin are used in dataset.

Keywords-fake coin, fake coin detection, representation in dissimilarity space, SIFT(Scale Invariant Feature Transform), dissimilarity matrix, heat map.

## I. INTRODUCTION

The image processing techniques done on the images are wide in varieties which will cause the different effect on the images likewise some of the techniques such as copy-move (or) splicing, signature, watermarking or any other object which get added to the original by various means. coins are widely used in our daily life such as vending machines, parking meters, telephone booths and so on. Compared with paper currency, coins benefit from their great resistance to abrasion, and thereby can be used for quite a long time. However, in recent years, a lot of illegal counterfeiting rings manufacture and sell fake coins, which have caused great loss and damage to the society. The fake coins made nowadays are of fairly high quality, so they often bear great resemblance to their genuine counterparts, which renders the detection of fake coins extremely challenging.

Digital image processing is an area characterized by the need for extensive experimental work to establish the viability of proposed solution to a given problem, here the solution is to find the fake coins using an image. An important characteristic underlying the design of image processing system is the significant level of testing and experimentation that normally is required before arriving at an acceptable solution.

This characteristic implies that the ability to formulate approaches and quickly prototype candidate solution generally plays an important role in reducing the cost and the time required to arrive at a viable system implementation .digital image processing is the user of computer algorithms to perform image processing on digital images. as a subfield of digital signal processing, digital image processing has many advantages over analog image processing. it allows a much wider range of algorithms to be applied to the input data, and can avoid problem as much as build up of noise and signal distortion during processing.

The entire process in this paper can be defined with the help of the flow chart given below. In this the input image is given for which we have to calculate the scaling factor,based on the scaling factor thus calculated the features of the image has to be extracted with the help of the SIFT algorithm. This extracted features are later then matched with neighbors, this will produce the matches and scores of two images. Finally with the help of number of matched key points the dissimilarity ratio is obtained, then the values are pass through heat map to display the dissimilarity matrix.

## II. LITERATURE SUEVEY:

[1]. In this survey, a complete analysis of object recognition methods based on local invariant features from a robotics perspective was presented. The survey includes a brief description of the main algorithms described in the literature, with specific analyses of local interest point computation methods, local descriptor computation and matching methods, as well as geometric verification methods. Different algorithms were analyzed by considering the main requirement of robotics applications: real-time operation with limited on-board computational resources and constrained observational conditions derived from the robot geometry (e.g. limited camera resolution). Evaluations in terms of accuracy, robustness, and efficiency were presented. In addition, various object recognition systems built using different keypoint-descriptor combinations were evaluated in a service-robot domestic application, where the final task to be performed by a service robot was the manipulation of objects. From the results reported it can be concluded that for robotics applications (i) the most suitable keypoint detectors are ORB, BRISK, Fast Hessian, and DoG, (ii) the most suitable descriptors are ORB, BRISK, SIFT, and SURF, (iii) the final performance of object recognition systems using local invariant features under real-world conditions depends strongly on the geometric verification methods being used, and (iv) the best performing object recognition systems are built using ORB-ORB and DoG-SIFT keypoint-descriptor combinations. ORB-ORB based systems are faster, while DoG-SIFT are more robust to real-world conditions.

[2]. The system developed in this paper is intended for the recognition of given classes of environmental sounds and is motivated by a practical surveillance application. The proposed system uses a discriminative method based on one-class SVMs, together with a sophisticated dissimilarity measure, in order to classify a set of sounds into predefined classes. The effectiveness of various acoustic features as well as the influence of features combinations were studied. We focused on novel sets of relevant features derived from wavelet decompositions. Besides, this paper deals with robust features used with a 1-SVM-based classifier in order to have a system that quietly works, independent of recording conditions. More research is needed to understand how adapting 1-SVMs parameters for sound classification occurs under very noisy conditions. This can be achieved by using different kinds of techniques that aim to use adaptation methods or robust decision strategies.

[3].Clustering of face images in video sequences is a difficulttask, since significant changes in lighting and viewpoint occur. This paper has introduced a novel method for creating a dissimilarity matrix for the face images using SIFT image features, which is fed to a hierarchical average linkage clustering algorithm. Experimental evidence for the clustering quality was provided by using the F measure, the OE and the statistic as figures of merit. The assessment was conducted on a set of face images acquired by a part of a feature length film. The clustering results are very satisfactory. In the future, we aim to use the proposed dissimilarity matrix as input in different clustering algorithms, not only hierarchical but partitional as well. Automatic calculation of the number of clusters sought, will be also pursued. Finally, the method will be tested on larger data sets.

## III EXISTING APPORACH:

We employ one-class SVM for fake coin detection in this study. One-class SVM was proposed by Scholkopf et al. and was considered a natural extension of the support vector algorithm to the case of unlabelled data. In general, the objects belonging to the class are termed as targets, while those outside the class are called outliers. With a set of training samples from the same class, the basic idea of one-class SVM is to learn a hypersphere which can enclose most of the training samples while minimizing the volume of the sphere at the same time. As with SVM, the kernel trick is employed to map the input data to some feature space in which they can be linearly separable. In the mapped feature space, the origin is considered as the only sample from the second class. Then a maximum margin hyperplane separating the training samples from the origin will be learned.

## IV. PROPOSED APPROACH:

Due to the fact that matching Ai against Aj

doesn't produce the same matching result to matching Aj against Ai, whereas the dissimilarity matrix should be symmetric, we perform the matching twice; once for the pair (Ai, Aj ) and once for the pair (Aj , Ai). The maximum number of keypoint matches found in the two matches is the final matching result for the specific pair of images. Finally, the above number of keypoint matches is transformed to a dissimilarity ratio (DRij ) between the two compared images using the formula:

$$DRji = DRij = 100(1 – Mij/min(Ki,Kj) )$$

where Mij is the maximum number of keypoint matches found between the pairs (Ai, Aj ), (Aj , Ai) and Ki, Kj are the numbers of keypoints found in Ai, Aj respectively. DRij ∈ [0, 100] and high DRij values indicate large dissimilarity
between face images. DRij is considered as the element Dij of the dissimilarity matrix, constructed for the N facial images. Figure 1 shows the dissimilarity matrix for the test set used in our experiments. In this point, it should be
noted that performing the matching twice for the same pair, does not increases significantly the calculation time, since the time consuming calculation of the SIFT image features is done only once.

**BLOCK DIAGRAM**

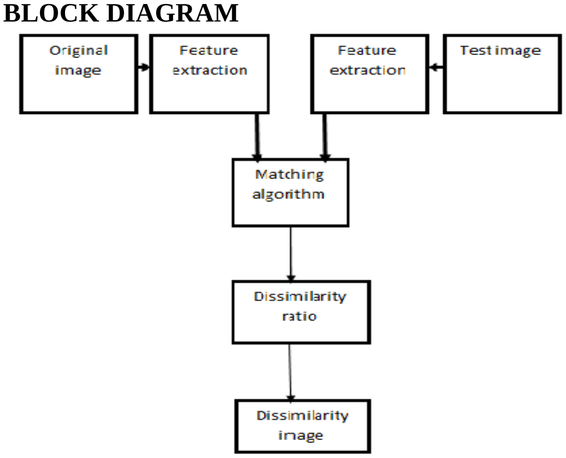


**Fig:Operational diagram**

**SCALE INVARIANT FEATURE TRANSFORM:**

The scale invariant feature transform is a feature extraction where it transform image feature into scale-invariance co-ordinates. The main goal of the SIFT is

Extract distinctive invariant features
Matching
Invariance to scale and rotation
Change in 3D point view
Addition of noise

Step:1 scale space peak selection (different sigma)
i)those will be potential points.
Step:2 key point localization
Step:3 orientation assignment
i)assigning orientation to the key points.
Step:4 key point descriptor
i)describing the key point as a high dimensional vector(128 feature vector) margin hyperplane separating the training samples from the origin will be learned.

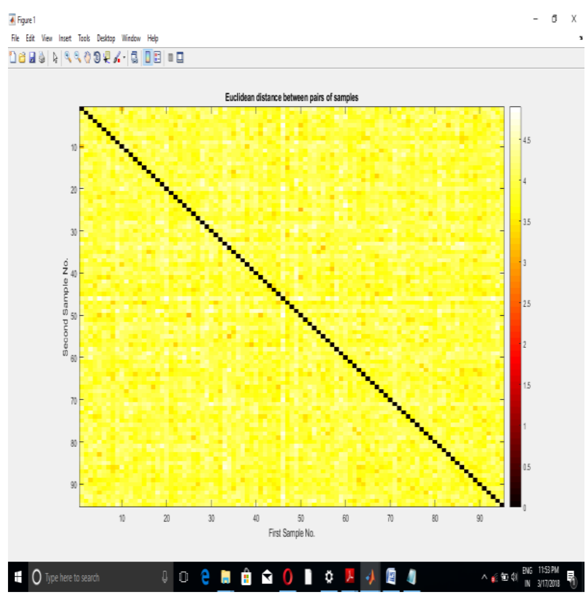


Fig.Dissimilarity-image

**CONCLUSION** :

A fake coin detection method using the characteristics of coin image which is proposed in this paper. The coin image is represented in the dissimilarity space, whose dimension is determined by the number of prototypes. Each dimension corresponds to the dissimilarity between the coin image under consideration and a prototype. In order to compute the dissimilarity between two coin images, the local key points on each image are

detected using the DOG detector and then described by the SIFT descriptor. Afterwards, the matched key points between the two images can be identified efficiently based on the characteristics of the coins. We also propose a post processing method to remove mismatched key points.Since the number of fake coins is very limited in real life, we use dissimilarity matrix to obtain the result, here the dissimilarity values are pass through heat map to display the dissimilarity image. In spite of the promising results achieved, the proposed approach is not without shortcomings. As stated above, for each type of the coins, some genuine coin images are needed for training. Yet, for some rare coins, it may not be easy to obtain enough genuine images for training. How to address this issue deserves a closer look and will be the focus of our future work.

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